第23卷 第2期
1985年4月

古脊椎动物学报
VERTEBRATA PALASIATICA

Vol. 23, No. 2
Apr., 1985

# 内蒙阿左旗乌兰塔塔尔中渐新世的牛科化石

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**关键词** 内蒙古乌兰塔塔尔 中渐新世 牛科

**内容提要**

内蒙阿左旗乌兰塔塔尔地区中渐新世地层中发现的牛科化石计两属两种——齐氏翰海兽(*Hanhaicerus qii* gen. et sp. nov.)和似亚洲古高齿兽(*Palaeohypsodontus* cf. *asiaticus*)。新属比中新世的相近种类如 *Eotragus*、高齿兽(*Hypsodontus*)、戈壁兽(Gobiocerus)等均原始，个体小，齿冠低。新属下臼齿齿冠珐琅质轻微褶皱，内侧附尖和肋相对发育，下次尖前臂与下后附尖不连接，$M_3$ 的下次小尖和下内附尖之间有褶沟，齿冠高度指数相对小等特点均与同时代的古高齿兽有很大的差别。

牛科化石，从新第三纪开始，特别是在上新世和更新世时，发现的材料丰富，种类繁多，研究深入。但在中新世以前，人们却知之甚少。1958年，苏联古生物学家特洛菲莫夫(Trofimov)报道了在蒙古塔塔尔沟中渐新世地层中发现的牛科化石，取名为亚洲古高齿兽(*Palaeohypsodontus* asiaticus)。其材料为一带 $M_2$—$M_3$ 的下颌骨断块和一单个的 $M_3$。这是本文记述以前比较可靠的渐新世纪录，也是牛科化石中最古老的代表。

在我国内蒙古中渐新世乌兰塔塔尔动物群中，也发现了一新属新种——齐氏翰海兽和一亚洲古高齿兽相似种的牛科化石。这一发现使我们对牛科早期成员的形态特征有了更多的了解。

该地区发现的其他偶蹄类材料，在文末也以附录形式予以简单记述。

笔者感谢法国古生物学者托马斯(Dr. H. Thomas)，在他访华期间所给予的热情帮助；在研究过程中，所内陈冠芳等同志提供了许多宝贵意见；谢树华、彭春同志帮助采集和修理标本；张杰同志摄制图版；陈瑶同志代绘插图，作者在此向他们表示衷心感谢。

## 标本记述

**牛科 Bovidae Gray, 1821**

**古高齿兽属 *Palaeohypsodontus* Trofimov, 1958**

**似亚洲古高齿兽 *Palaeohypsodontus* cf. *asiaticus* Trofimov, 1958**

(图版 I, 1A, 1B, 1C; 插图 1)

**材料** 一残破的左下颌骨附颊齿 $P_4$—$M_2$ 及 $M_3$ 的前叶和齿冠破损而主要保留齿根

的 $P_2$ 和 $P_3$、萌发中多出的 $P_3$(V7638)。

**地点和层位**　内蒙古阿左旗乌兰塔塔尔，中渐新统。

**描述和比较**　$P_4$ 已萌出并开始使用，臼齿均有一定程度的磨损，可知该标本基本上为一成年个体。

下颌骨联合部未保存，但似乎相当靠前；角突和上升支均缺如。骨体浅，底缘和齿槽缘均微向下突。$P_2$ 之下颌骨体高为 12 毫米。后部底缘虽破损，但从骨中保存的泥岩和下颌骨弯曲弧度判析，$M_2$ 之下颌骨体高稍大于 12 毫米。在 $M_2$ 下后尖处的颌骨体厚度约为 8.5 毫米。后颏孔位于 $P_2$ 后根之下，靠近骨体中部，为一卵圆形孔，长轴为前后向。在此孔之前10毫米齿缺的外侧，有一较大的前颏孔，但已部分破损。

下颊齿从 $P_2$ 到 $M_3$ 紧密排列无齿缺。前臼齿齿列明显短于臼齿齿列。$P_2$ 和 $P_3$ 冠面已破损，各只保存两齿根。有趣的是，在 $P_3$ 之下还长着一个牙齿，尚未露出齿槽，它主要由三尖组成，外侧下原尖高大，内侧下前尖较矮小，下后尖比较明显。在下原尖和下前尖之间有一褶沟向后外方伸延。这个牙齿与鹿科和牛科中以往见到的 $P_3$ 一般形态很不一样，可能为一多出齿(讨论见后)。

$P_4$ 的后外壁稍向外突。与臼齿形态完全不同，舌侧有两个主要褶凹和在下后尖处的一浅沟。下前谷比较开阔，形状规则。下后谷深而狭窄，从牙齿的后内侧先向外伸然后折向前外伸向牙齿中部。下后尖处的浅沟，略将此尖分成两叶，其后叶向后伸，比较窄长。下前尖和下原尖均明显，下内尖十分微弱。牙齿外壁较平。无齿带。

下臼齿在齿槽内明显地向前倾，约与前臼齿成 45° 角斜交，齿冠珐琅质不褶皱。齿根很长，约等于或大于中等磨蚀程度的齿冠高度。前后内外齿带均不发育。无古鹿褶。附柱仅在外中谷齿冠基部表现为一突起。

$M_1$ 近长方形，后叶略宽于前叶。牙齿前缘微微凹入，紧靠 $P_4$ 之后叶。下原尖和下次尖均成新月形脊，但前者比较张开。下后尖和下内尖在横向上比较压缩，前者不重迭在后者之上。舌面比较平，下后尖肋和下内尖肋以及下前附尖、下后附尖和下内附尖均不发育。牙齿磨蚀较深，以致下原尖和下后尖之间及下次尖与下内尖之间的珐琅质内凹均已消失。

$M_2$ 的基本形态似 $M_1$，但稍大。舌侧的附尖和肋比在 $M_1$ 中的相对发育。前内凹已消失，后内凹成弱的新月形。

$M_3$ 仅保存三角座，其形态与前两臼齿的相近。

**表 1　似亚洲古高齿兽 (*Palaeohypsodontus* cf. *asiaticus*) 的下颊齿(单位：毫米)**

<table>
<tr><th rowspan="2">标本＼牙齿</th><th colspan="2">$P_2$</th><th colspan="2">$P_3$</th><th colspan="3">$P_4$</th><th colspan="3">$M_1$</th><th colspan="3">$M_2$</th><th colspan="3">$M_3$</th><th rowspan="2">$P_2$—$M_2$</th></tr>
<tr><th>长</th><th>宽</th><th>长</th><th>宽</th><th>长</th><th>宽</th><th>高</th><th>长</th><th>宽</th><th>高</th><th>长</th><th>宽</th><th>高</th><th>长</th><th>宽</th><th>高</th></tr>
<tr><td rowspan="2">V7638</td><td rowspan="2">约 6.0</td><td rowspan="2">约 2.0</td><td rowspan="2">约 7.0</td><td rowspan="2">/</td><td rowspan="2">7.0</td><td rowspan="2">4.0</td><td rowspan="2">5.0</td><td rowspan="2">7.4</td><td colspan="2">下后尖处</td><td rowspan="2">8.5</td><td colspan="2">下内尖处</td><td rowspan="2">/</td><td colspan="2">下后尖处</td><td rowspan="2">约长 32</td></tr>
<tr><td>5.1</td><td>6.2</td><td>6.3</td><td>7.8</td><td>5.8</td><td>8.3</td></tr>
</table>

由上表可知，在牙齿磨蚀较深的情况下，齿冠高度指数 $\left(\frac{\text{齿冠高度}}{\text{齿冠宽度}}\times 100\right)$ $M_1$ 为 122，$M_2$ 为 124，$M_3$ 为 143。

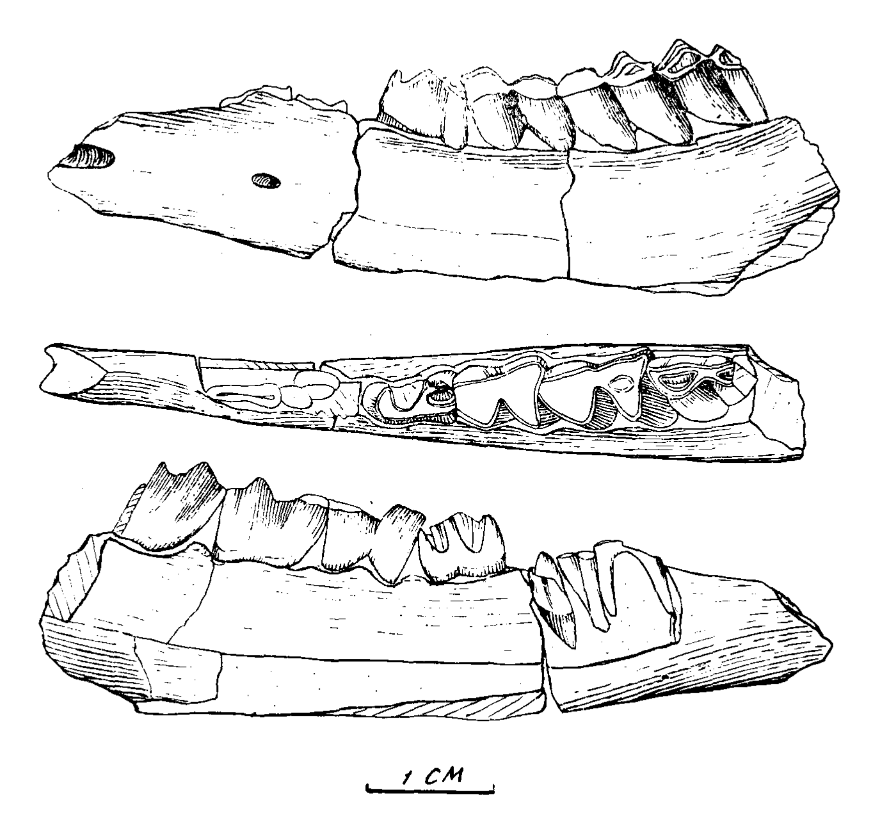



图1 似亚洲古高齿兽的下颊齿（V7638）上，外侧面观；中，嚼面观；下，内侧面观

Fig. 1 *Palaeohypsodontus* cf. *asiaticus*, lower cheek teeth (V7638) upper, external view; middle, crown view; lower, internal view

乌兰塔塔尔的标本，下颊齿高冠，内壁较平，附尖和肋均不发育，无齿带、附柱和古鹿褶，前臼齿齿列相对比臼齿齿列短，这些基本上都是牛科的特征。它在下臼齿比较窄长，齿冠相对于稍晚期的相近种类显得低，齿根长，以及齿冠高度指数等方面均接近于亚洲古高齿兽。在特洛菲莫夫的文章中(Trofimov, 1958, p. 244, p. 245)，呈平均磨损状态的牙齿测量是(以毫米计)：$M_2$ 长 6.5，宽 4.5，高 5.5；$M_3$ 长 9，宽 5，高 12。其中 $M_3$ 的高度肯定错了，从他的图中(p. 246)测得，$M_3$ 在下后尖处的高度大约为 6.8 毫米，在下内尖处接近 7 毫米。这样亚洲古高齿兽的齿冠高度指数就与我们的标本很接近了。但乌兰塔塔尔的标本从牙齿上看，约比亚洲古高齿兽大 30%。且该种前面的下颊齿不明，是否与本文记述的标本一致，尚不得而知，故我们将乌兰塔塔尔的材料暂定为亚洲古高齿兽的相似种。

应该指出的是，亚洲古高齿兽相似种标本前面的颊齿，$P_2$ 和 $P_3$ 齿冠已破损，无法辨认，两齿根是那样地靠上，那样地相互分开，且后一牙齿之下还有一尚未萌出的牙齿，这种情况使人容易认为仅保留齿根的 $P_2$ 和 $P_3$ 是乳齿。但如果是这样，就出现了几个重要问题不能解释：1.违背了正常的换牙规律。$P_4$ 已经萌出并开始使用，而前面的"$DP_2$"和"$DP_3$"尚未脱落，"$P_3$"仍在齿槽中，"$P_2$"连个痕迹也没有。这种情况不仅在偶蹄类中是不可能的，就是在哺乳动物其他类群中也未曾见过。2."$DP_2$"下无"$P_2$"，在渐新世这样早

期的牛科类群中，前臼齿就消失掉两个，是难以令人置信的。3.在齿槽中的牙齿与其后的 $P_4$ 在形态上完全不一样，它与以往发现的牛科或鹿科中的 $P_3$ 相距太远。因此，前面保留齿根的两牙齿只能是 $P_2$ 和 $P_3$，$P_3$ 之下的牙齿是一特殊的多出齿。这种情况很特殊，也很个别，但在奇蹄类及其他偶蹄类中，有人确实见到过。例如王伴月（1982）在"内蒙古蒙古鼻雷兽的骨骼形态和系统分类"一文中曾记述过一块标本（V3254-1）具两个左 $P_2$。

## 翰海兽属（新属）*Hanhaicerus* gen. nov.

**特征** 齿冠高度指数比在古高齿兽属中低的一种原始牛类。下臼齿下次尖前臂不与下后附尖相连，$M_3$ 的第三叶比较短，下次小尖与下内附尖之间有褶沟。

## 齐氏翰海兽（新种）*Hanhaicerus qii* sp. nov.

（图版 I，2A，2B，2C，3，4；插图 2）

**特征** 同属的特征。

**正型标本** 一左 $M_2$—$M_3$（V7639）。

**归入标本** 一破损的左上颌骨附部分 $M^1$（V7640）；一残破的右 $M_2$（V7641）。

**地点和层位** 同似亚洲古高齿兽。

**词义** 属名 *Hanhaicerus* 表明此类动物发现在今内蒙古浩翰的戈壁滩上；种名 *qii* 赠给在野外工作中给予帮助的齐陶同志。

**描述** 下臼齿齿冠珐琅质表面轻微褶皱，无齿带和古鹿褶，附柱极弱，齿根很长。内壁相对也较平坦，但附尖和肋较古高齿兽的为强。下后尖多少有些重迭在下内尖之上，此两尖在横向上比较压缩。下原尖和下次尖成新月形脊，但下次尖前臂不与下后附尖相连，致使下后内凹前方开口与外中谷相通。前后内凹亦成弱的新月形。$M_3$ 具短宽的第三叶。下次小尖新月形脊前臂较圆凸，后臂略平，愈向基部愈粗壮。舌侧下内尖比较膨大。在下内附尖和下次小尖之间有一褶沟向外然后折向前内方向伸延，与下后凹之间被下次尖后臂舌端与下内附尖连接的窄脊隔开。此沟内部浅，浅于其前的下后内凹，大约在牙齿齿冠磨损掉三分之一时即行消失。但在开口处较深，可能在齿冠磨蚀到一半时才不复存在。

表 2 齐氏翰海兽（*Hanhaicerus qii* gen. et sp. nov.）的下臼齿（单位：毫米）

| 标本 \ 牙齿 | $M_2$ 长 | $M_2$ 宽 | $M_2$ 高 | $M_3$ 长 | $M_3$ 宽 | $M_3$ 高 | |
|---|---|---|---|---|---|---|---|
| V7639 | 9.5 | 下内尖处 6.1 | 下内尖处 6.2 | 13.5 | 下内尖处 6.2 | 下内尖处 7.2 | $M_2$—$M_3$ 长 22.8 |
| V7641 | 10.0 | 下内尖处 6.2 | 下内尖处 6.1 | / | | | / |

由上表可知，齐氏翰海兽下臼齿的齿冠高度指数大体上是 100。

一残破的上颌骨上（V7640）保存有眶下孔，小而圆，直径为 2.5 毫米，位于 $P^4$ 的前上方。

牙齿仅 $M^1$ 保存外侧部分，长约 9.8 毫米。前附尖和中附尖很发育，从牙齿顶部到基部

均很明显。但前尖肋与后尖肋尤其是后尖肋不大发育。该牙齿的前附尖和中附尖比较垂直牙齿冠面，而不象鹿科中的那样比较倾斜。这个牙齿总的特征有点象步林（Bohlin: 1946, p. 212）描述为 $M^2$ 的 T. b. 585 号标本，但后者尺寸小，齿冠的高度指数比我们的大。

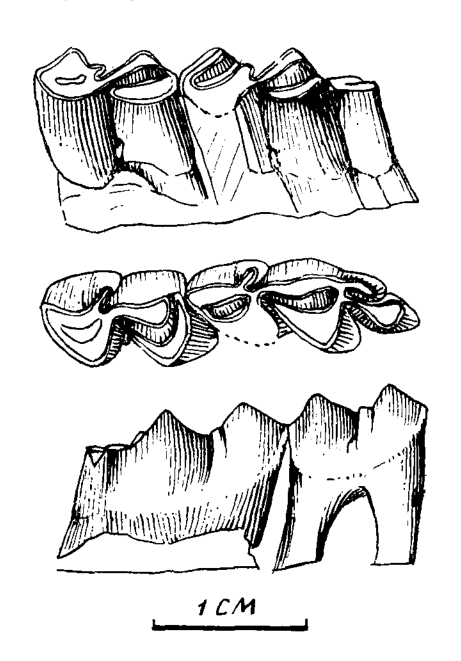



图 2　齐氏翰海兽的 $M_2$—$M_3$ (V7639) 上，外侧面观；中，嚼面观；下，内侧面观

Fig. 2　*Hanhaicerus qii* gen. et sp. nov., $M_2$—$M_3$ (V7639). upper, external view; middle, crown view; lower, internal view

**比较和讨论**　乌兰塔塔尔的标本，下臼齿比较高冠，附尖和肋不很发育，内壁相对较平，齿冠不收缩，附柱微弱，无齿带和古鹿褶，均表明它们应该属于牛科。但与这个科中较早期的种类相比，都有较大的差别。如非洲中新世地层中发现的 *Walangania* 等属，牙齿低冠，附尖和齿带均很发育，它们的牙齿性质与鹿科更接近。与欧洲早期的牛科化石如 *Eotragus*、*Paratragucerus* 和高齿兽等以及亚洲的戈壁兽相比，它们无论在个体大小或齿冠高度等方面均与我们的标本不同。欧亚大陆发现的角羊（*Oioceru*s）的下臼齿前端内外两侧都有发达的前褶，我们的标本无此特征。在我国甘肃，步林 1946 年还记述了一带有 $M_2$—$M_3$ 的下颌骨(T. b. 307)。这块化石在未磨时齿冠高度为17.5毫米，大大超过了我们的标本。上述甘肃材料，是否属渐新世动物群的成员，原作者持怀疑态度。

新属翰海兽和包括本文记述的相似种在内的亚洲古高齿兽的下臼齿有很多共同的特征。它们都无齿带和古鹿褶，附柱只在外谷齿冠基部成结节状。但两者之间的差别仍很显著(见下表)。

**表 3　翰海兽 (*Hanhaicerus*) 和古高齿兽 (*Palaeohypsodontus*) 的下臼齿特征比较**

| | *P. asiaticus* | *P.* cf. *asiaticus* | *H. qii* |
|---|---|---|---|
| 个　体 | 小 | 中等 | 大 |
| 齿冠高度 | 高 | 高 | 较低 |
| 舌面的附尖和肋 | 不很发育 | 不很发育 | 相对较发育 |
| 齿冠珐琅质表面 | 光滑 | 光滑 | 轻微褶皱 |
| 下次尖前臂与下后附尖 | 连接 | 连接 | 不连接 |
| $M_3$ 第三叶内侧褶沟 | 无 | / | 有 |

翰海兽比以往发现的中新世牛科成员在许多特征上（如个体小、齿冠低等）都显得原始，与同时代的古高齿兽相比在某些特征上也相对表现原始或保守。翰海兽和古高齿兽无疑代表了在渐新世中期牛科类群的两个不同支系。翰海兽和似亚洲古高齿兽在我国内蒙地区发现，再次证明了亚洲是牛科的起源中心。

## 附 记

### 鹿科 Cervidae Gray, 1821

### 原鹿 *Eumeryx culminis* Matthew et Granger, 1924

（图版 I, 5 A, 5B, 6）

在内蒙古阿左旗乌兰塔塔尔地区中渐新世地层里，发现的偶蹄类材料除上面记述的牛科化石外，尚有三个右下牙床断块，分别保存颊齿 $DP_4$—$M_1$（V7643）；$DP_4$（V7644）和 $M_1$（V7645）。

表 4 原鹿（*Eumeryx culminis*）的下颊齿测量（单位：毫米）

| 牙齿 / 标本号 | $DP_4$[1] | | $M_1$ | | |
|---|---|---|---|---|---|
| | 长 | 宽 | 长 | 宽 | 高 |
| V7643 | 6.8 | 2.8 | 6.2 | 3.8 | 3.7 |
| V7644 | 7.9 | 3.4 | | | |
| V7645 | | | 6.4 | 3.7 | 3.6 |

1) $DP_4$ 的宽测于第三叶，$M_1$ 的宽和高在下后尖处测得

$DP_4$ 具三叶，比较窄长，前、外、后齿带均很发育。$M_1$ 的新月形脊明显，内侧下后尖和下内尖高耸。下后尖肋和下内尖肋很发育，以前者更突出。下前附尖显著倾斜。下原尖和下次尖前后向压缩。前后齿带均很发育。下外中凹中的附柱低矮。牙齿低冠，具古鹿褶。这些特点以及牙齿的大小均与蒙古中渐新世三达河组中发现的 *Eumeryx culminis* 接近一致，可视为同种。原鹿在我国内蒙古三盛公和甘肃党河流域的中、晚渐新世地层中也有过报道。

（1984年9月7日收稿）

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# FOSSIL BOVIDS FROM THE MIDDLE OLIGOCENE OF ULANTATAL, NEI MONGOL

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**Key words** Ulantatal, Nei Mongol; Middle Oligocene; Bovid

## Summary

Fossil of bovids was not known before Late Oligocene except *Palaeohypsodontus asiaticus* Trofimov, 1958, represented only by a broken mandible with $M_2$-$M_3$ and an isolated $M_3$. The discovery of the new finds from the Middle Oligocene of Ulantatal provides new information regarding the dental morphology of the early bovids.

Bovidae Gray, 1821

*Palaeohypsodontus* Trofimov, 1958

*Palaeohypsodontus* cf. *asiaticus* Trofimov, 1958

**Material** A fragmentary left lower jaw with $P_4$-$M_2$, the front part of $M_3$, roots of $P_2$ and $P_3$, with additional $P_3$ within the alveolus (V7638).

**Description** Mandible slightly convex along ventral border, being 12 mm. high below $P_2$ and almost the same below $M_2$, thickness of the mandible 8.5 mm. at $M_2$. Beneath the rear root of $P_2$ there is an elliptical foramen, situating at the middle of the shaft. In front of this one over 10 mm. distance is another big mental foramen, unfortunately broken.

All the lower cheek teeth arrange closely one another from $P_2$ to $M_3$. Crown of $P_2$ and $P_3$ have been broken away. Additional $P_3$ has formed but not eruped out of the alveolus, consisting of paraconid, metaconid and protoconid, among which the last one is the biggest and highest. The groove between protoconid and paraconid opens forwards. This tooth seems to be dissimilar morphologically with $P_3$ of the later members either in Bovidae or in Cervidae.

$P_4$ slightly worn and rectangular in outline with somewhat larger width posteroexternally. Of two main valleys on the lingual side of the tooth, the anterior one widely open and regular in shape; the posterior one deeper and narrower, extending outwards and forwards. The metaconid is divided into two lobes by a shallow groove, the posterior lobe extending backwards. The metaconid well developed, both paraconid and protoconid distinct, entoconid weakest. The cingula not developed as in the molars.

The lower molars are different from the premolars morphologically. The crown strongly oblique forwards to that of $P_4$ at 45° angle. The enamel smooth and the length of the roots as long as the crown height in heavier wear. No trace of cingulum and "Paleomeryx-fold". The additional column in the median external valley indicated only by a small tubercle on the base of the crown.

Front margin of $M_1$ somewhat concave; protoconid and hypoconid selenodont; metaconid and entoconid compressed transversely, the former does not overlap the latter. The lingual wall of the tooth rather flat. The metaconid rib and entoconid rib as well

as parastylid, metastylid and entostylid all weakly developed. The tooth is so heavily worn that both the front inner sulcus between protoconid and metaconid and the rear one between hypoconid and entoconid disappeared.

$M_2$ is essentially similar to $M_1$ morphologically, but slightly larger. The ribs and stylids are clearer than those in $M_1$. The front enamel inner sulcus worn away, the rear one still existed, being selenodont in shape.

The trigonid of $M_3$ preserved as in the first two molars and the inner sulcus is also selenodont in shape.

The measurements of the lower cheek teeth are given in the Chinese text. The ratio of height to breadth of the tooth at worn stage is 122% for $M_1$, 124% for $M_2$ and 143% for $M_3$.

**Comparison and Discussion** In Ulantatal specimen the lower molars are hypsodont. The ribs and stylids developed weakly and inner walls are nearly flat. There are no cingula and paleomeryx-fold. The premolar series is shorter in proportion to the molar one. All these features indicate that the specimen should belong to Bovidae, which differ from those either in Tragulids or in cervids (*Eumeryx* for instance). The lower molars have relatively lower crown and long roots in comparison with those in later bovids, demonstrating that the Ulantatal specimen should be pertained to *Palaeohypsodontus*. The genus originally consists only of one species--- *P. asiaticus* found in the Middle Oligocene Hsanda Gol Formation of Mongolia, which is in agreement with our specimen in geological age. Apart from many main properties mentioned above, our material resembles *P. asiaticus* both in the ratioes of length to breadth and of height to breadth of the tooth. In his paper, Trofimov took the height of $M_3$ as 12 mm. by mistake. The crown height of $M_3$ taken from his figure should be about 6.8 mm. at the metaconid and near 7.0 mm. at the entoconid. Thus, the index of the crown height of our specimen is essentially the same with the corresponding tooth of *P. asiaticus,* although the latter is heavier worn than the former.

The Ulantatal specimen is about 30 per cent larger than that of *P. asiaticus,* so we tentatively treat it as *P.* cf. *asiaticus.*

*Hanhaicerus* gen. nov.

**Diagnosis** A genus of less hypsodont than *Palaeohypsodontus*. The anterior arms of the hypoconids of the lower molars are isolated, not joining to the metastylids. On $M_3$ the hypoconulid separated from the entostylid by a groove.

*Hanhaicerus qii* sp. nov.

**Diagnosis** as for the genus.

**Type** a left $M_2$-$M_3$ with the trigonid of $M_3$ slightly damaged (V7639).

Other materials: A broken maxilla with external part of $M^1$ preserved (V7640); A damaged right $M_2$ (V7641).

**Locality and Horizon** Middle Oligocene; Ulatatal, Alxa Zuoqi, Nei Mongol.

**Description** The roots of the lower molars long. The surface of enamel slightly wrinkled. No cingula and "paleomeryx-fold" developed. The internal walls relatively flat, but ribs and stylids stronger than those in *Palaeohypsodontus,* and the metaconids somewhat overlap the entoconids. The metaconids and entoconids compressed transversely. The protoconids and hypoconids are selenodont, but the anterior arms of the hypoconids do not join to the metastylids. Thus the rear inner enamel sulcuses open to the median external valleys anteriorly. The third lobe on $M_3$ is relatively short. The

hypoconulid also forms V-shaped, with anterior arm convex while the posterior one flat and becoming robust towards the base. The entostylid more developed, in the rear of which at the lingual side of the tooth there is a groove projecting outwards then forwards, separating from the rear inner sulcus by a narrow crest connecting hypoconid and entostylid. Inside shallow is the groove, which disappeared as the crown worn reaching one third of its height, while the mouth of the groove worn away at the wearing stage of half height.

The measurements of the lower molars are given in the Chinese text. The index of the crown height is nearly 100%.

In the broken maxilla preserved an infraorbital foramen, small and round, its diameter being 2.5 mm., situating in front of and above $P^4$.

Only the external part of $M^1$ preserved, the crown of which is 9.8 mm. long and 6.2 mm. high at metacone. The parastyle and metastyle are extremly developed from top to base, which are nearly perpendicular to the crown surface of the tooth. The paracone rib and metacone rib are very weak but distinct.

**Comparison and Discussion** The genera *Palaeohypsodontus* and *Hanhaicerus* are so far the only Middle Oligocene bovids and the earliest representatives of the family. They are different from other genera of Bovidae, including Miocene members. In Africa, the Miocene bovids, *Walangania,* for instance, the lower molars are brachyodont, showing the tendency of development of cingula and stylids, which are the essential characteristics of Cervidae. In Europe Miocene bovids, such as *Paratragocerus* and *Hypsodontus,* and the Asiatic genus *Gobiocerus* are more hypsodont and bigger in size than the Middle Oligocene genera.

*Hanhaicerus* differs from *Palaeohypsodontus* in being of relatively larger size, less hypsodont, with stronger ribs and stylids, more wrinkled enamel surface, the anterior arms of the hypoconids not connecting with the metastylids and having a groove between the hypoconulid and the entostylid on $M_3$.

It seems that *Hanhaicerus* is not only more primitive or conservative than the Miocene members of bovids, but also than *Palaeohypsodontus*. *Hanhaicerus* and *Palaeohypsodontus* may represent two distinct lineages of Bovidae originated in the Middle Oligocene. The discovery of Ulantatal materials may indicate that Asia is the center in the origin and development of Bovidae.

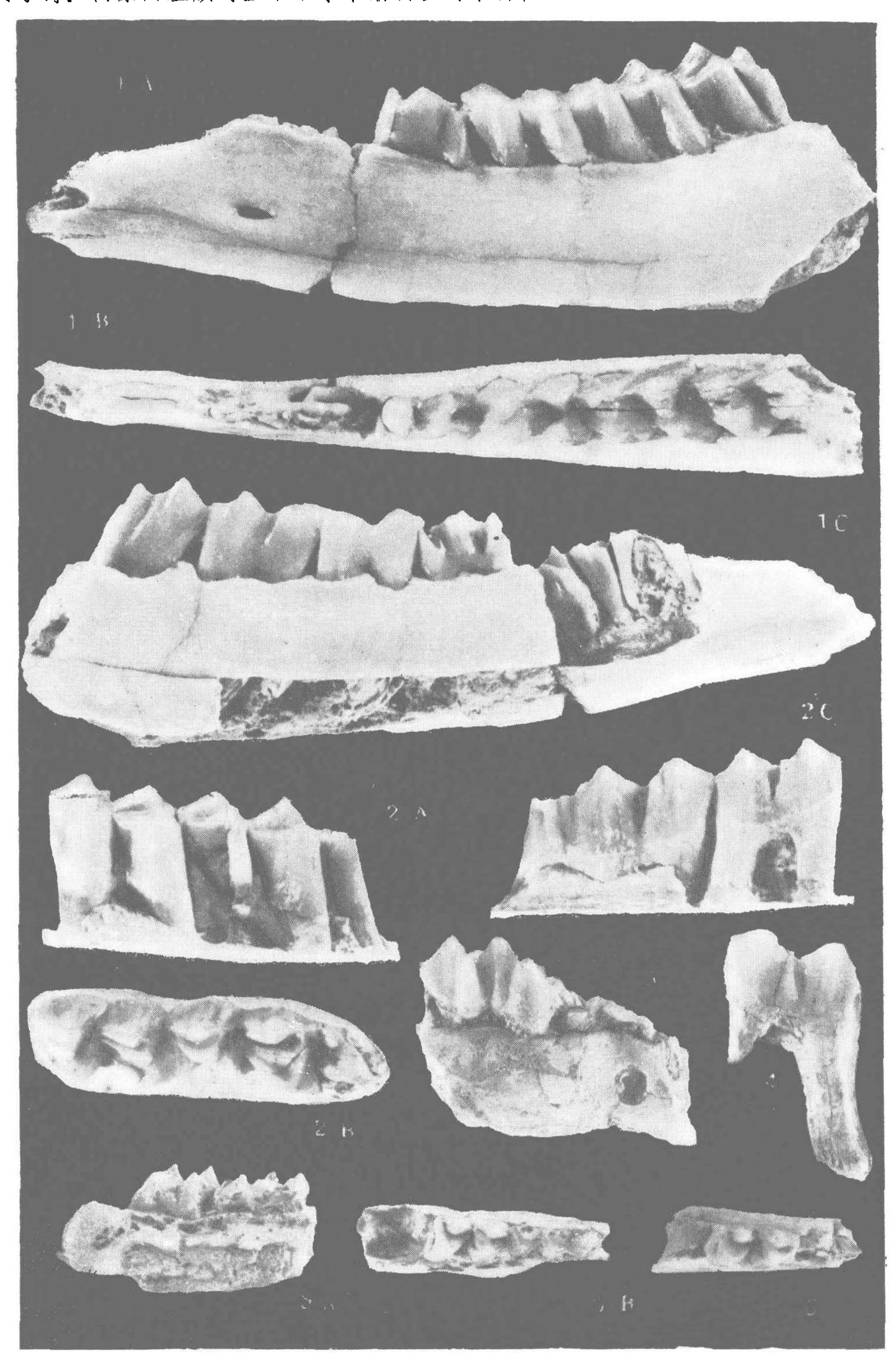
## Appendix

Cervidae Gray, 1821

*Eumeryx culminis* Matthew and Granger, 1924

In Ulantatal Fauna, apart from the bovid fossils described above there are three right dentary fragments: one with $DP_4$-$M_1$ (V7643); another with $DP_4$ (V7644); the last with $M_1$ (V7645), representing the rest of Artiodactyla in the region. For the measurements see table in the text in Chinese.

$DP_4$ is long, with three lobes and much more distinct cingula. $M_1$ has pronounced selenodont protoconid and hypoconid and high metaconid and entoconid; parastylid more oblique to the alveolus. The protoconid and hypoconid compressed anteroposteriorly. The median external column low. The anterior and posterior cingula more developed. The tooth is brachyodont and has "paleomeryx-fold". All these features are nearly identical to those of ***Eumeryx culminis*** known from Middle Oligocene Hsanda Gol Formation.




**似亚洲古高齿兽** (*Palaeohypsodontus* cf. *asiaticus* Trofimov, 1958)

1．左下颌骨 (V7638).

1A，外侧面观；　1B，嚼面观；　1C，内侧面观；

**齐氏翰海兽** (*Hanhaicerus qii* gen. et sp. nov.)

2．左 $M_2$—$M_3$ (V7639).

2A，外侧面观；　2B，嚼面观；　2C，内侧面观；

3．左上颌骨断块 (V7640)，外侧面观；

4．右 $M_2$ (V7641)，外侧面观；

**原鹿** (*Eumeryx culminis* Matthew et Granger, 1924)

5．右下颌骨附 $DP_4$—$M_1$ (V7643).

5A，外侧面观；　5C，嚼面观；

6．右下颌断块附 M (V7645)，嚼面观，全部放大2倍